Occupational HAZARDS

JANUARY 1940

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PERIODICAL DIVISION

There's Profit in Prevention

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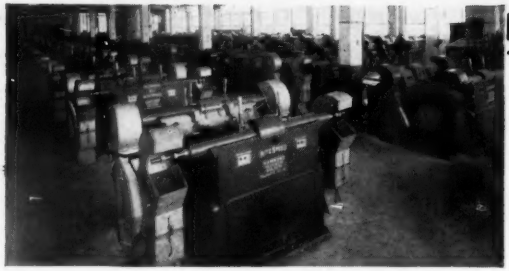
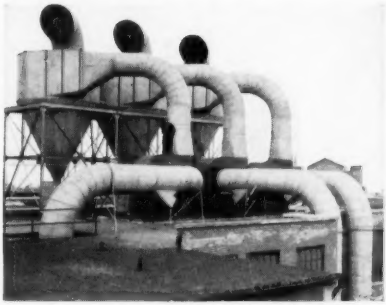


(Left) Buffing Department, Trico Products Corp. Note the K & B hoods and piping on buffing and polishing lathes.

(Below) Giant K & B "Cyclones" on the roof of the Trico plant.

"Cleanest Buffing Installation in the State of New York"



Trico Products Corporation, Buffalo, N.Y., manufacturers of windshield wipers, have used Kirk & Blum Dust Control Systems since 1929, and have installed additional systems as their business increased and their plant expanded.

The top illustration shows the Kirk & Blum system installed in the windshield wiper production buffing department. Seven fans, having a combined capacity of 225,000 C.F.M., remove the dust from 149 spindle lathes. Concerning this system, the Acting Head of the Bureau of Industrial Hygiene once said: "This is the cleanest buffing installation in the State of New York."

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The publications briefly described in this service department are prepared by manufacturers' technical experts. The data they contain on equipment supplies and prevention methods applies to varied phases of occupational hazard problems. Note those items desired on coupon below and send to Occupational Hazards, 812 Huron Rd., Cleveland, Ohio.

219—REPRINT of an article by John M. Kane of American Air Filter Co. on practical suggestions for design and maintenance of effective exhaust systems. Included are several charts and specifications for certain types of exhaust problems.

220—PENTHOUSE

A descriptive folder containing specifications and charts pertaining to the Falstrom Penthouse for dust and fume control has just been issued. Specific problems in various industries are described, including laundries, paper machines, dye houses, public halls, and general ventilation are included.

221—DUST CONTROL

The American Foundry Equipment Company has available a new brochure describing their "Dustube" dust collectors. Included is information about various atmospheric control problems, and specifications for several types of removal equipment.

222—SANITATION

A catalogue of sanitary equipment for industrial installations is announced by the Crane Company. Described in this catalogue is a complete line of devices for all kinds of industrial sanitation, plus the various plumbing products required for installations.

223—BIFURCATOR

A booklet describing the DeBothezat Bifurcator for removing high temperature, corrosive, toxic, or hazardous fumes has been issued by the American Machine and Metals, Inc. The Bifurcator can be installed as an integral part of existing fume removal equipment. The new catalogue contains complete specifications.

224—SAFETY STEPS

Three types of safety treads are describe in the current folder of the Melflex Products Company. Specific uses and advantages of each are pointed out. Also included is information on a waterproof cement for bonding treads to surfaces on which they are to be used.

225—PORTABLE LIGHTS

The catalogue of the Euclid Rubber and Mfg. Co. contains information on their line of safety portable lighting equipment.

226—FACE PROTECTION

A full-vision helmet for protection of the head and face in hazardous operations is described in a folder of the S. W. Duncan Company.

(Continued on next page)

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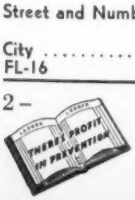


227—PAINT

The B. F. Goodrich Company's Acidseal paints are explained in a new four-page catalogue. These paints are derived from rubber, and are particularly applicable to surfaces where corrosive or otherwise destructive fumes, smokes, and mists are found. These paints also have a quality of elasticity, which makes them adhere to non-rigid surfaces.

228—DUST ENGINEERING

The publication of the American Air Filter Company "Dust Engineering," has information on current installations, specifications and descriptions of their dust control equipment, and other information of interest to those having a dust control problem.

229—CUTTING TORCH

A new safety cutting and welding torch is the subject of a folder issued by the Dill Manufacturing Company. The folder covers the features and applications of the new toreh.

230—UNIT HEATER

The "Electromode" portable unit heater for industrial applications is the subject of a new folder issued by the American Foundry Equipment Company.

Health Standards . . .

AMERICAN standards today designate adequate guards for machinery as well as safe practices for many hazardous industrial processes. The same method has recently been turned to problems of industrial disease prevention.

This year the American Standards Association committee on Toxic Dusts and Gases has prepared four draft standards upon which final vote is now being taken. These drafts make available to industry authoritative information on safety limits for carbon monoxide, benzene, hydrogen sulfide, and carbon disulfide. In addition to the engineering information usually given in American Standards, these include sections describing how the poisonous substance acts on human beings, how it is absorbed, and how poisoning therefrom can best be treated.

These standards will provide much needed information for the use of A.S.A. committees working on standards for the technical requirements of exhaust equipment to carry off dangerous concentrations of dusts, fumes, and gases.

LUNGS, as you probably know, are pretty important things. They are the seat of tuberculosis, silicosis, asbestosis, and a number of other ailments, many of which are of occupational origin. To give you who are preventing occupational respiratory diseases some idea of the problem, we quote Mr. W. H. Lehmberg, a research scientist for the American Optical Company. He says "the entire surface of a normal lung is equivalent in area to a strip of land occupied by a house 31 feet square. In 24 hours, the normal respiration is 600,000 cubic inches of air breathed, equivalent to the air in a room 7′ x 7′ x 7′." This amazing set of figures is a little far removed from the practical science of air hygiene, but you can get an idea of how widely toxic and irritating substances are dispersed when inhaled. And it gives emphasis to the fact that irritants in the lungs affect a tremendous quantity of tissue, all of which can have a deleterious effect on the body.

MR. RALPH L. LEE, a public relations man from General Motors, brings to mind an interesting point about "safety." In a recent talk he outlined the five vital points necessary for a complete and practical safety program. He mentioned:

1. Interest in safety on the part of top management:
2. Good Housekeeping;
3. Mechanical Safeguards;
4. Safety Education;
5. Periodic Safety Stimulation.

At first blush, these points would seem to apply to "mechanical accident" prevention as distinguished from "occupation diseases." However, no safety program is complete—nor satisfactory—unless it considers the more subtle hazards which cause occupational disease. Dermatitis, respiratory

diseases, systemic poisoning and all the other occupational diseases are none the less real because they are more difficult to recognize. You know about an accident. You see it. You are shocked by it. And you know, roughly, how, why, and where it was caused. Not so with many occupational diseases. They are often slow in developing, and often management and worker will not know how or why such disease was caused.

But just because of the subtlety of these occupational diseases, don't be fooled by them. They cost money—in compensation, lost time, interference with processes, loss of skilled workers' services.

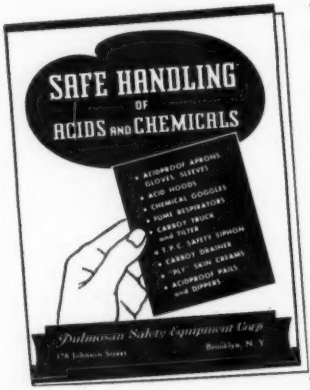
Some managements are slow to recognize the presence of these occupational health hazards. To these we say, expand Mr. Lee's five points to include "safety" in its broad sense—protection against mechanical accidents, and *also* protection against occupational disease. "Safety" means the whole field of industrial health. Let's make our safety programs complete. And adequate. It saves you money to control all hazards.

THE JOB of preventing occupational disease belongs both to management and worker. We hear of countless cases where the failure of one or the other results in failure to control a hazard. Management can provide ventilation systems, sanitary facilities, protective clothing, protective devices—yet disability continues to result. Why? Because employees are not using these devices properly or sufficiently. Management cannot stop with providing these devices. Of course, you have to start with preventive and protective devices, but then they must be used right. And this means employee co-operation. Or, to put it another way, employees must be *sold* the idea of getting behind the safety program 100%. They must see what you are getting at, what you are trying to do for them, and how. It's a selling job. Not public relations, but private relations. No job of selling management does is more important than the job of keeping employees healthy.

U. S. STEEL has an effective plan for making workers wear goggles on jobs where they are not always necessary. Usually when goggles are needed only part of the time, they tend to fall into disuse, to become dirty and out of shape. U. S. Steel

(Continued on page 32)

If Your Plant Handles Acids and Chemicals-



WRITE FOR THIS FOLDER

of specialized protective equipment!

This new folder illustrates and describes a careful selection of Respirators, Safety Goggles, Acid Aprons, Gloves, Sleeves and Hoods, Carboy Truck, Carboy Tilter, Safety Siphon, Skin Creams and Acid Pails and Dippers. Each item is designed for its special purpose and affords highest safety. WRITE TODAY for this valuable folder.

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Occupational HAZARDS

JANUARY 1940

Volume 2 Number 4

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Goggles Save $96,000 . . .

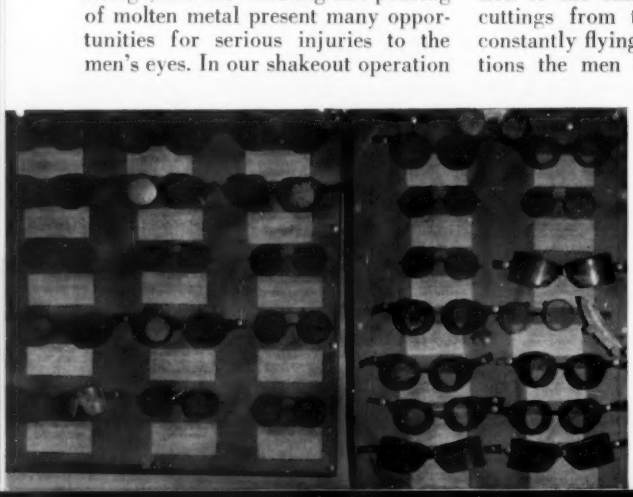
A case-history of the eye-protection program by Mackintosh-Hemphill Company in which savings exceeded $96,000.

BY IRVIN A. BRINKMAN
Personnel Director
Mackintosh-Hemphill Co.
Pittsburgh, Pennsylvania

TO JUSTIFY the need for a program of accident prevention, it might be well to outline some of the conditions with which we have to contend.

We operate steel and iron foundries, roll and machine shops. Each of these operations offers many serious hazards. Our primary operation, the charging of furnaces and cupolas, including the preparing of scrap and other materials necessary for the charge, and the handling and pouring of molten metal present many opportunities for serious injuries to the men's eyes. In our shakeout operation there is dirt and flying particles; in the cleaning, chipping and grinding operations there is the constant hazard offered by the use of air chisels cutting sharp fins from the edges of rolls, the ends of nails used in molding that are fused against the metal, and sharp edges along the castings.

During the grinding operations there is the hazard of high-speed abrasive wheels, with the possibility of their breaking and flying, in addition to the emery particles and the cuttings from the metal which are constantly flying. During these operations the men work in fairly close



Every goggle that prevented an accident is mounted on this board in the Mackintosh-Hemphill Plant, to provide a dramatic exhibit of the protection given by goggles.

proximity to each other.

The operating requirements of today call for exceedingly hard metal, and during the turning of the rolls and the machining of the castings there is the ever-present hazard of flying cuttings of various sizes to not only the operator but also the other persons working in or passing through the area.

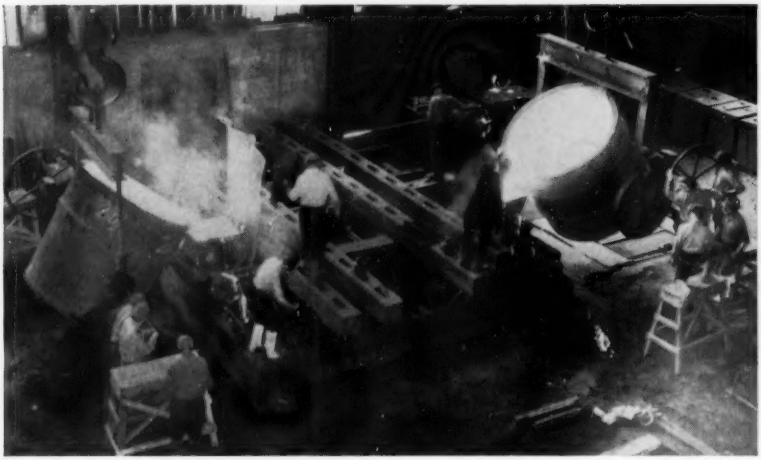
Cleaning large roll in the Mackintosh-Hemphill plant. Note that all men are wearing goggles and respirators.

Analysis of Accidents

When we decided to institute an accident prevention program, one of the first things that was done was to analyze the accidents of several previous years so as to ascertain where the accidents were occurring and what was causing them. This was done so that a practical program could be developed to prevent the recurrence of such accidents. This analysis disclosed that we were having a great number of accidents which were causing injuries to eyes and also were causing the loss of a number of eyes. We learned in tabulating the costs of these accidents and injuries that our eye cases were expensive, even when they did not cause the loss of an eye. Eye injuries require the services of a specialist and such services are quite costly.

Now that we had discovered the type of accident that was the cause of some of our most costly injuries and had also learned where these accidents were occurring, the next logical procedure was to develop a program that would eliminate them. A survey was made of the various operations in an endeavor to select the correct type of goggle for the particular hazard, and we finally selected six types. We use a closed-cup type, commonly called a "chipper's goggle," for all chipping, cleaning, grinding, and shakeout operations. For men that wear glasses and occasionally need goggles for special operations, we supply the cover-all type. Around the furnaces and cupolas and during the pouring operations, there are three types in use, a wide-vision goggle for general use, a half blue and white goggle for charging, and a full light blue lens for pouring. Our lathe hands, machinists, helpers, and laborers working in the roll and machine shops are supplied with spectacle-type goggles with wire side shields; our maintenance men use the same type.

Within the past two years all men that have to wear glasses continually



Pouring a 60,000 pound heat of metal at about 2400 degrees. All men equipped with goggles and chrome leather leggings.

have been supplied with prescription-ground goggles at the company's expense. The program requires the foremen to wear goggles at all times, and, in addition, anyone entering these hazardous operations, regardless of their position, are required to wear goggles. For especially hazardous operations, in addition to goggles the men are required to wear copper screen face guards.

We had isolated the causes and locations of our eye injuries; we had decided upon the departments in which we thought protective equipment should be used; we had selected the types of goggles that we thought would afford the greatest protection and, at the same time, could be worn with comfort by the men (and the idea of comfort for the wearer should not be overlooked as it is important); the only thing remaining was to put the program into operation.

Operation of the Plan

Our Management was convinced that it was necessary to do something to prevent accidents as our insurance rate was indicative of the need for action. Just how to secure the desired results was a matter of debate. Like most organizations starting its initial effort in the prevention of accidents, we were a bit reticent about using forceful methods.

The procedure followed at that time was to issue instructions to all superintendents and foremen that goggles were to be used in the various operations designated and that we expected full cooperation.

We soon discovered that we were attempting to reverse old customs and habits of long standing and to introduce new ones which were unpopular and, the men thought, useless and

(Continued on page 17)

Right off the Docket

The trend of litigation on workmen's health and accident compensation is reflected in these briefs of the latest and most representative cases coming to trial in the intervals between issues. Familiarity with this trend is important to every industrialist.

Strain in Abdominal Region Activates a Pre-Existing Malignant Cancer and Brings Award

The worker was engaged in lifting and pushing heavy rocks and stones into a river to serve as a foundation for bridge piers. While doing this work he suffered a strain in the abdominal region. He became ill and some four months later died. The immediate cause of his death was found to be cancer.

The Court in making an award said, death of an employee is compensable if pre-existing malignant cancer from which employee suffered in dormant condition and as a result of injury sustained by the employee in his employment the cancer was rendered active, which activation caused or hastened the employees death.

Causey vs. Kansas City Bridge Co.— (Louisiana) 191 So. 730 (November-1939).

Compensation Board Finds Blow Causes Loss of Vision. Rejects Contention that Disability Resulted from a Cataract

The Workmen's Compensation Board made an award to the claimant in this case for loss of vision in his left eye. The injury for which the compensation was given was sustained while the claimant was engaged in scrapping coal in the company's mine. A lump, the size of a man's fist, struck him in the eye inflicting the injury.

The Company took an appeal from the Board's finding, contending that the whole, or at least part of the loss of vision, was due to a cataract. The Company's doctors all testified that the disability was due to a cataractous condition rather than the blow from the piece of coal. In contradiction to this evidence the claimant showed that when he started to work, some two years before the accident, his eyes had been examined and no cataractous condition was found. His doctor testified that the loss of vision was caused by a blow and that the claimant did not have a cataract.

The Court of Appeals affirmed the award of the Compensation Board holding that there was sufficient evidence to support the finding despite the preponderance of evidence offered on behalf of the Company. *Tierney Mining Co. vs. Meyers et al.* (Kentucky) 132 S.W. 2nd 312 (October-1939).

Benzol Poisoning an "Occupational Disease" Under Terms of North Carolina Compensation Act.

The deceased employee worked for the defendant furniture company for approximately three years immediately preceding his death. He worked in a finishing room which was 30 x 50 feet in size and 8 to 10 feet high. This room was adjacent to the painting and spraying room where the furniture was sprayed with a paint or other liquid containing a 15% solution of benzol. Immediately after the spraying, the furniture was brought into the poorly ventilated finishing room where the deceased worked on it while it was still wet. The benzol fumes filled the room, at times so densely that a gaseous vapor could be seen. The

employee became sick; lost his appetite, lost weight, was unable to sleep. Finally he was unable to continue to work. His condition grew progressively worse, and he died some two months after leaving his employment.

The Commission found that the employee came to his death as a result of breathing the benzol fumes, and that the same resulted naturally and unavoidably in his death from an occupational disease under the terms of the Workman's Compensation Act. That such occupational disease constituted an "injury by accident" "arising out of and in the course of employment."

The Company claimed that the Commission's finding was incorrect; that the death of the employee was due to some cause other than the benzol poisoning. The case was appealed to the Superior Court and finally to the Supreme Court of the State, but the decision of the Commission was upheld by both courts.

Tindall vs. American Furniture Co. et al. (North Carolina) 4 S.E. 2nd 894 (October-1939).

Injury to Shoulder while Using Wrench Results in Death

While at work tightening nuts on a cotton loom with a seven inch wrench the employee in this case felt a pain in his shoulder. He went to the hospital a few days later and an examination disclosed large amounts of pus in the shoulder. Two operations were performed to drain off the pus. Infection spread and the employee died three weeks after having felt the pain in his shoulder. Further examination revealed that the employee had been suffering from osteomyelitis, which is a destruction of the outer covering of the bone resulting from infection.

The important question the Commission had to decide was whether the infection had resulted from a strain sustained while using the wrench to tighten nuts on the loom, or had the pain which the employee felt while using the wrench been experienced because at that time infection was already present in the shoulder. The Commission decided in the employee's favor, holding that the injury resulting in death was caused by an accident arising out of and in the course of employment; that the infection which brought on the death was due to a strain sustained while using the wrench to fix the cotton loom.

Next of Kin of Clinton Cole vs. Anderson Cotton Mills et al. (South Carolina) 4 S.E. 2nd 908 (October-1939).

Court Holds Groin Injury to be Contributing Cause to Death From Lobar Pneumonia

The husband of the claimant slipped while unloading cases of beer and suffered an injury in his groin. Prior to this accident he had not missed a day's work in 11 years, and appeared to be in the best of health. After the accident he experienced continuous pain which forced him to go to various hospitals and doctors. About a month after the accident he died. An examination showed that the death was due to lobar pneumonia together with a complication of a number of other diseases.

The Commission made an award for the death. It held that the injury to the groin was a contributing cause of the death, that it made the employee susceptible to disease, and "lit up" and hastened the effects of the pre-existing diseased condition.

Liberty Mutual Ins. Co. vs. Money (Virginia) 4 S.E. 2nd 739 (October-1939).

Meaning of "Guard" or "Safety Device" Defined by Court

In this case the Court in making an award held: Failure of deceased, who was working on a barge when he fell into the river while attempting to pry loose a sack of cement, to stay within guard rail on barge while doing his work, after being instructed to do so, was not a deliberate failure to use a guard or protection against accident within contemplation of the Workmen's Compensation Act.

Under the Compensation Act provision that an injured employee's deliberate failure to use an adequate guard or protection against accident shall be ground for refusing compensation, the "guard" or protection contemplated by statute means something which is provided by an employer principally as a safety or protection to employee and not that which is placed on premises or on machinery as a component part of it and whose principal purpose is to facilitate or expedite the work.

Brown vs. Kansas City Bridge Co. (Louisiana) 191 So. 755 (November-1939).

CRITICAL Analysis of Accident Causes: Old and New

By Max D. Kossoris
U. S. Bureau of Labor Statistics

IF THE workers who were killed and injured during 1937, together with their families, could have been assembled at one place, they would have exceeded the population of any city in the United States, with the single exception of New York. During that one year, about 17,800 employed workers were killed, 112,000 permanently injured, and 1,534,000 temporarily disabled. The monetary loss to workers, above the amount offset by workmen's compensation benefits, amounted to at least 250 million dollars. The cost to employers well exceeded 1½ billion dollars.

There is no reasonable excuse for this state of affairs. "Accidents don't just happen. They are caused." And it is because attention is being paid to the accident-causing factors that tremendous strides in accident prevention have been made by safety engineers, safety minded workers and management. Any number of establishments, and a number of entire industries, have succeeded in reducing their accidents, and consequently in reducing the injuries to workers which follow in the wake of these accidents. But what are the accident causes? How are they found? How can information based on accidents be used to prevent the recurrence of such accidents? As is usually the case, intelligent action must be based on information intelligently brought together and so analyzed as to bring out clearly the essential elements. The information should focus on the facts on which prompt action may be taken and that require attention.

New Methods

Until recently statisticians had not worked out a method of compiling their data in a form really useful for practical accident prevention. They classified accident into "falls," "being struck by objects," "vehicles," "elevators," "handling objects," etc. The difficulty with this method of analysis is that it is confusing and reveals nothing about the causes of accidents. A "fall" is a type of accident, but not the cause of an accident. But why did the worker fall? What was the unsafe condition in his environment that occasioned the accident? What did he or fellow workers do that led to the accident? About all this the old type of statistics revealed nothing. The same comment holds for practically every single item in the tool chest of the accident statistician. The constant question of the safety man: "Why did the accident occur?" remained unanswered, for the reason that statisticians compiling accident data, like the organizations for which most of them worked, were compensation minded, and not safety minded.

The new method of accident cause analysis was developed under the

auspices of the American Standards Association. A large number of interested groups participated. Now, after about 12 years of work, the new method has been nearly completed, and a practical statistical method of analysis is possible. The method is popularly known as the "Heinrich Cause Code," after H. W. Heinrich, a safety engineer, who formulated the basic concepts. The new technique is not difficult and it makes good sense—both to the accident statistician, and, what is more important, to the safety man.

In its approach, the new method parallels the procedure of the safety man making an investigation of an accident which resulted in an injury to a worker. The safety man's first question is: "How did the man get hurt?" For instance, did he get his hand caught in gears? Did he fall into an elevator shaft? Did he get a steel splinter in his eye? His second question is: "What was wrong?" Was the gear unguarded? Was the elevator door open? Did the hammer, from which the steel splinter came, have a mushroomed head? And the third question: "What was done that was wrong? Did someone remove the gear? If so, why were no precautions taken to prevent anyone from starting the machine? Did the elevator repair man fail to guard the elevator door? If so, why did he do it? What should have been done instead?

Available Data

From this approach to the problem, it is clear that the safety man wants to know:

1. What type of accident occurred?
2. What was the unsafe environmental factor?
3. What was the unsafe act?

In the proposed method an accident is broken into six factors:

1. the accident type
2. the agency—i.e. the object or substance which was most closely related to the accident type and which, because of its defective condition, permits corrective action
3. the agency part—i.e. the gears of a machine, the shaft of an elevator.
4. the unsafe mechanical or physical condition of the agency
5. the unsafe act
6. the unsafe personal factor which led to the unsafe act.

To discuss these various accident factors in detail is far beyond the limits of this article. But a few examples will illustrate the new procedure. Against this procedure has been set the old method to make clear the difference between them.

Example 1.

John Smith, to save himself the trouble of going to the warehouse for a good ladder, uses one that has several cracked rungs. Instructions from his foreman are not to use defective ladders and to report to the foreman every defective ladder. Smith climbs up the ladder, one of the cracked rungs breaks, and Smith falls to the ground, fracturing his left leg.

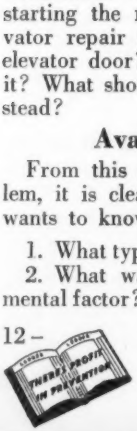
Analysis

New method

Accident type: fall to a different level
Agency: ladder
Agency part: the rung
Unsafe mechanical or physical condition: defective (cracked)
Unsafe act: using defective equipment
Unsafe personal factor: disobeying instructions

Old method

Fall (or "fall from a ladder")



Example 2.

A machinist, repairing the gears of a lathe, has removed the guards. He has completed his job and has started the machine to satisfy himself that the lathe is now ready for operation. But he has not yet replaced the gear guard. Mike Jones passes by, wearing a loose shirt and loose overalls. He is so intent on getting back to his bench that he does not notice the moving, unguarded gears. He comes too close to them. His shirt sleeve is caught in the gears, and before the machine can be stopped, he has suffered severe lacerations on his arm.

Analysis

New method

Accident type: caught in, on, or between
Agency: lathe
Agency part: gears
Unsafe mechanical or physical condition: unguarded
Unsafe act: failure to place warning sign, signals, etc.
Unsafe personal factor: disregard of instructions

Old method

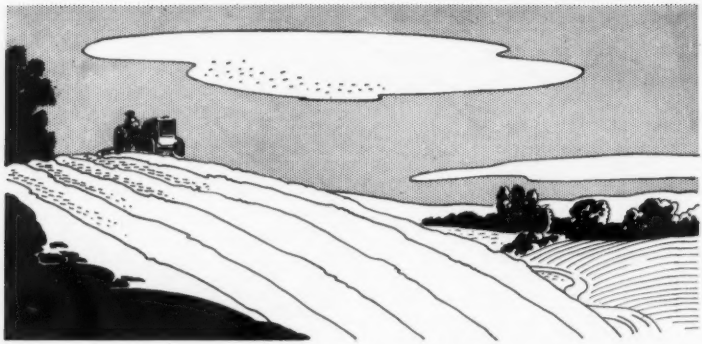
Lathe (possibly "gears of lathe")

The two illustrations given demonstrate both a simple and a complex accident, and how the method of analysis works in each. Taking the first accident, the old method of analysis merely reveals that there has been a fall. It may go as far as to indicate that the fall was from a ladder. The new method reveals that there was a fall to a different level, that the defective object most closely associated with the fall was a defective ladder, and that the unsafe act consisted of using a defective ladder contrary to instructions.

For the second, more complicated accident, the old method indicates that the accident cause was the lathe, and may go so far as to indicate that the gears of the lathe were primarily involved. But it gives no clue whatever to indicate what was wrong. The new method identifies the accident factors sufficiently to permit a clear reconstruction of the accident: A worker was injured by getting caught between the unguarded gears of a lathe because he wore improper clothing and did not look where he was going.

Statistics

When it is borne in mind that statistics may be based on the experience of a single department of a plant, the entire plant, all the plants of a large corporation, all the plants in a State, or all the plants in the country, the significance of the new approach becomes clearer. When accident data can clearly list defective equipment and indicate the defects, management can provide for proper guards, proper tools, proper equipment. When the unsafe acts are shown, management can provide for proper instruction and supervision. And, as long as there are plants in which management is not concerned with safety, the State can use this type of information to formulate rules and regulations for the safeguarding of equipment and the providing of working environment reasonably free of accident hazards. It is now possible to formulate accident statistics intelligently, and toward the practical needs and guidance of those interested in accident prevention. The tool is ready—the task now is to get people to use it.



How Clean Is The Air?

Scientific measurement of contaminants in industrial air gives management guide to occupational disease control . . .

HOW CLEAN is the air where your men work? Are they safe from respiratory disease caused by contaminated air? The certain way to know the answer to these questions is to measure the impurities, if any, in the air where your men work by scientifically proved techniques.

Some confusion has existed in certain management quarters as to just exactly how to know the condition of the air in a plant. There has been, perhaps, a too great unfamiliarity with the procedures for air testing. Actually, there is nothing mysterious, nor particularly forbidding, about scientific measurement of possible contaminants in the air. To simplify and consolidate the high spots of the existing information on air measurement, the Air Hygiene Foundation has issued bulletins describing approved procedures.

The Foundation's Preventive Engineering Committee, under the direction of Philip Drinker of Harvard, prepared these studies entitled "Routine Sampling for Control of Atmospheric Impurities."

Management must have approved methods of collection, determination, and apparatus for checking 45 dangerous substances commonly found in industrial atmospheres. Such a list of dangerous substances would include ammonia, arsenic dust, benzene, chromic acid, carbon monoxide and dioxide, hydrocarbons, lead dust and fumes, mercury, methanol, sulphur dioxide, and many others.

Two steps are involved in checking the air of a workplace—first, measurement of air currents, and second, estimation of impurities. The resulting data can then be applied to the design of control equipment or to checking the results brought about by such equipment.

Procedures for both high and low air velocity operations must be considered. For the purposes of selecting sampling and control methods, in relation to exhaust systems in plants or mines, several distinct types of atmopheric impurities must be considered:

A. Relatively insoluble mineral dusts, such as silica, many silicates, and fly ash.

B. Relatively soluble mineral dusts, like calcite (limestone).

C. Finely-divided fume substances that are difficult to catch in water. Examples are lead, lead oxide, and zinc oxide.

D. Dusts that may be affected by water. Examples are flour, leather, and soap. Many of these dusts are explosive if mixed with air.

E. Aqueous mists, such as chromic acid entrained from electroplating baths, or condensate from vats of various sorts.

F. Water-soluble gases, such as hydrochloric acid. Such soluble gases usually contain mist as well as gas, the proportions depending upon local conditions.

G. Gases or organic vapors, like benzene, soluble with difficulty. These react slowly with most liquids but may be absorbed readily by solids, such as activated carbon.

The impinger is commonly used in sampling dusts, and occasionally mists and some gases. It is definitely unsuited to certain other gases like chlorine or organic vapors. It is not efficient against finely-divided fume substances, such as lead or zinc oxide, and rarely is it suited to sampling organic dusts.

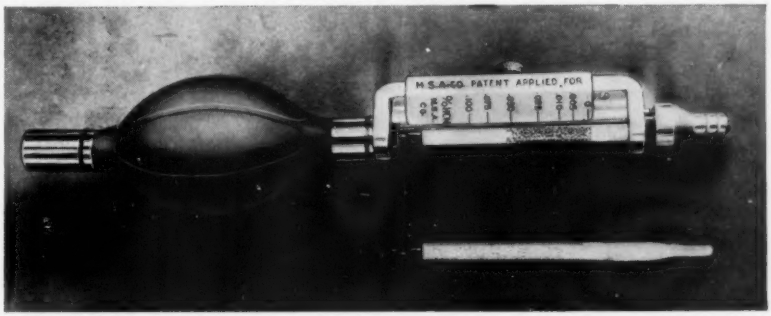
For sampling finely-divided fume

Photo courtesy Mine Safety Appliances

Electrostatic precipitator for the determination of fumes or other finely divided air contaminants.

Small hand analyzer for detecting the presence of hydrocyanic acid.

Photo courtesy Mine Safety Appliances



substances, like lead, a small electric precipitator gives accurate results. Barnes and Penney of Westinghouse Electric & Mfg. Co. have described a small precipitator which should be well adapted to field use and is now available. The various grab-sampling instruments give useful indications of changes in dustiness but do not imitate the impinger in any way, so that it is impossible to convert impinger to grab-sample counts.

Photo courtesy Mine Safety Appliances

Midget impinger for rapid determination of dust in the air. This small impinger is well suited to collect small samples of dust for counting, in a short time.

Most explosive dusts are affected by water, while some of them, especially organic dusts, are difficult to wet. Explosive concentrations of all such dusts are very high as compared with dust concentrations of hygienic significance so that explosive dusts are determined by weight rather than count.

Dust Analysis and Gas Sampling Methods

In the case of all dusts the estimation of the sample taken from the air can be made by counting representative fractions under the microscope, or the sample can be analyzed by appropriate chemical methods, or the material an be weighed. The large impinger and the electric precipitator are equally well adapted to either procedure. The midget impinger collects, in reasonable sampling time, a relatively small amount of dust, but enough for counting. Dusts, like silica, that are troublesome to determine chemically, are generally counted, while those like lead manganese, and cadmium, are determined chemically.

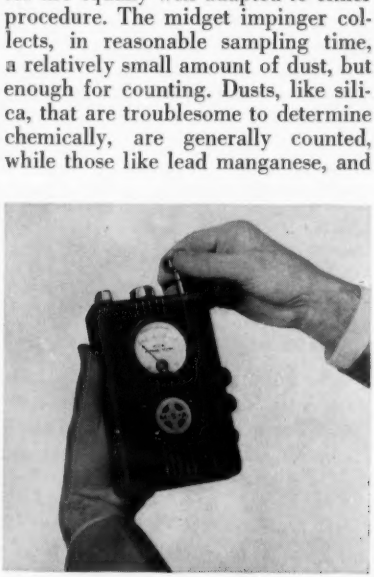


Photo courtesy Mine Safety Appliances

Pocket-size tester to determine the amount of methane in the air.

Concerning light field vs. dark field counting of impinger samples, for routine control work, the relative advantages of these two methods—no matter what sampling instrument is

(Continued on page 31)

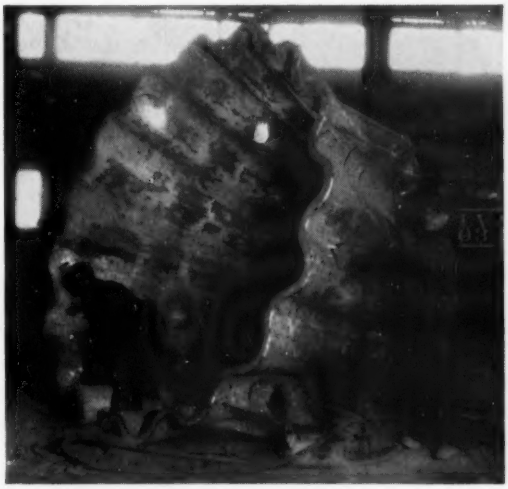
Goggles Save $96,000 . . .

(Continued from page 8)

uncomfortable. The claim in regard to the discomfort was not altogether unfounded, for we started this program in 1930, and there has been a marked improvement in the fit and comfort of goggles since that time.

After a time we discovered that our intended regulations were not being fully complied with by all foremen and employees, as there were occasional eye injuries coming in, although far less frequently. In January 1932, we had a roll turner involved in an accident which caused the loss of his eye and, upon investigation, it was found he had not been in the habit of wearing goggles. Previous to this accident we had been attempting to overcome another source of troublesome and expensive accidents—foot injuries. We had been prevailing on the men to wear safe-toe shoes, but with little success. Conditions surrounding the accident that resulted in the loss of an eye brought the whole situation forcibly to the attention of the Management. A conference was held and a definite decision arrived at which resulted in the outlining of the future requirements in connection with the prevention of eye and foot accidents.

The president outlined the regulations in a letter to all managers and supervisors and had them posted on all bulletin boards. The letter stated: "Any man receiving an injury which the use of goggles or safe-toe shoes would have prevented will lose his job and his foreman will lose one week's pay." Management definitely made accident prevention an integral part of operations and placed the responsibility for its success upon the supervisors. It was necessary to exercise the discipline outlined above only once to convince the employes that we intended to do everything in our

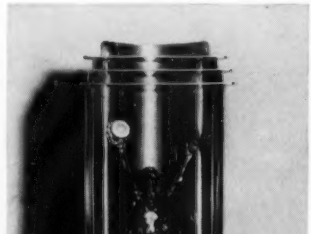


Men working on an 18-ton fluted slag laddle are protected by goggles against flying particles and dust. Every person going into a part of the plant where potential eye hazards exist is required to wear goggles.

power to eliminate these disastrous accidents. As a result of the decision outlined, the wearing of goggles in the designated operations and the use of safe-toe shoes one hundred per cent (which includes our foremen) has been a regular practice in all of our operations since February 2, 1932.

We supply all goggles, including the necessary prescription type, and purchase the shoes for the men at wholesale, deducting the cost of same from several pays. The methods adopted and used have been fully justified by the results that have been attained, in that we have not lost an eye or had a serious eye injury since January, 1932; and, of course, the benefits have spread throughout the entire operations enabling our plants to set up some splendid records.

One plant operated 466 days without a disabling accident and also set up an outstanding record of 677 days. Another one of our plants operated 505 days without a lost-time case, and just recently completed operating from June 27, 1938, to September 25, 1939—a period of 454 days — without accident. They were awarded The National Safety Council Award and also were awarded The President's Trophy of the Pennsylvania Manufacturers' Association for outstanding achievement in safety work.

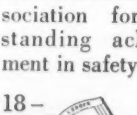


Costs

We have reduced our compensation costs 67% since January 1, 1931, and have gained many results of which it is impossible to tabulate the value, such as better housekeeping, improved methods, finer morale, and real co-operation among the employes.

It is impossible to learn of all the accidents that are prevented through accident prevention programs, but it is possible to keep a check on the number of eyes that are saved by the use of goggles. In the latter part of 1933 I decided to have every pair of goggles which were broken in service and had saved an eye sent to my office. Previous to that time we replaced the broken lense and returned them to service. Our collection now includes thirty-seven pairs of goggles which have saved an eye, and in four of these cases the doctor said the type of object that struck the lense and the force of its impact would have caused it to penetrate the man's brain and resulted in his death.

In Pennsylvania the average cost of a lost eye is $2,000; and figuring thirty-three eyes saved, this would have amounted to $66,000. The average cost of a fatality is $7,500, and four possible fatalities would have cost $30,000; or a total of $96,000 was saved in a period of about six years, and this through the use of goggles alone!



A Public Health Doctor Looks at the Problems in

SAFE HANDLING OF CHEMICALS

Part II

by HENRY FIELD SMYTH, M.D., Dr., P.H.
Assistant Professor of Industrial Hygiene, University of Pennsylvania

HAVING determined safe maximum exposures for animals, these may be used tentatively as possible safe limits for humans, but the materials so studied should be used only where careful checks and observations on the exposed workers can be carried out. (Threshold values for brief exposures may at times be determined on small groups of carefully selected and controlled human subjects, provided these exposures are stopped at the earliest indication of specific action.) Only after continued observations of this type have been made, should the material be introduced generally into industry, with recommendations as to the precautions which should be heeded in its use.

Where tests are to be run on materials which have already been introduced into industry before their toxicity is known, the above work should be supplemented by a series of measurements of concentrations under working conditions and by job analyses, to indicate the usual degrees of exposure, all correlated with physical examinations of large numbers of workers under varying conditions.

This seems like a very elaborate and expensive program, but potential danger so determined and guarded against is much to be preferred to even a few damage suits for illness or death with awards against the industry, the whole study costing less than a single suit for death.

Protective Measures

Having recognized and determined toxic hazards, we have available various methods of protecting workers so that useful, though dangerous chemicals may be safely manufactured and used. Some of these methods are:

1. *Substitution* of a similar but less toxic material. This is not a good method. It is much better to learn how to use safely a hazardous material than to discard it for a possibly less useful substitute often of unknown toxity. This method frequently lends a false sense of security and encourages careless use of substitutes.

NO FOG OR STEAM ON GOGGLES

You can positively keep your goggles and eye glasses from fogging, steaming and frosting *for a FULL DAY* with an amazingly successful new product called LENSITE created for this particular purpose. Already in use in scores of plants. Clean goggles in morning—don't take them off again until your shift ends. Thirty days' supply, 25¢. Try Lensite. It works. Order today.

The LENCO LABORATORIES, Inc.
624 Bondi Bldg., Galesburg, Illinois
"Member National Safety Council"

2. Installation of *exhaust ventilation* adequate to remove toxic materials *at the point of production* before they have a chance to penetrate working atmosphere. Booths or hoods may or may not be needed here. Never depend on general exhaust ventilation from ducts with inlets remote from points of production, as this disseminates harm rather than removes it. An example of this occurred in a textile leather plant where three deaths were probably attributable to the placing of an air intake for drying chambers in the center of the ceiling of a large room where a number of coaters were working. The men were using material which was about 50 per cent benzol, and the intake so installed created a current of the material from the working surface, past the workers, to the intake.

3. *Isolation* of processes so as to avoid the risk of general plant exposures.

4. *Shortening of necessary exposures* of unprotected men, and alternating dangerous with safe jobs.

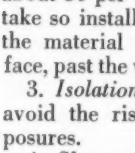
5. Provision of *personal protection* of workers by: (a) Adequate *respirators* if exposures are discontinuous and if workers must be active over considerable areas; (b) *positive pressure air helmets,* face masks or respirators supplying more air than needed for respiration so that leaks are always out and never in. They furnish excellent protection, if properly supplied with clean pure air, and if supplied with overhead airlines they allow of considerable mobility; (c) *protective non-absorbent clothing;* (d) *protective skin applications,* for hands, arms and face, often preferable to gloves which, if defective, may act as poultices. Applications are available to protect against either water-soluble or oily materials.

6. *Adequate upkeep* and good housekeeping maintenance, so that safe devices remain safe. This should include *periodic* checks on functioning of apparatus and on atmospheric concentrations. Frequently, elaborate exhaust systems which offered adequate protection when first installed and put into operation have been found entirely shut down "for the sake of economy," or so clogged by dusts as to be of little value.

7. *Pre-employment physical examinations* to exclude those who are likely to be particularly susceptible.

8. *Periodic physical examinations* to remove temporarily or permanently those showing early symptoms or signs of toxic effect, and also to indicate the need of increasing protective measures.

It is possible to use any essential chemical in industry with safety, provided we learn its potentialities of harm and how to recognize early harmful action, and provided we are willing to pay the price—in money, in equipment, and in vigilance—to make and *keep* conditions safe.



NEW LAWS

BY THEODORE C. WATERS

Chairman, Maryland Occupational Disease Commission
Member Legal Committee, Air Hygiene Foundation

THE YEAR 1939 saw three additional States join the ranks of those with laws providing compensation for occupational disease. With the addition of Arkansas, Idaho, and Maryland there are now 24 States and the District of Columbia that provide compensation for workers suffering from occupational disease.

In addition to these three new State laws, the States of New Hamshire, Oregon, Tennessee, Texas and Utah have authorized commissions to study the problem of occupational disease legislation and submit reports to their States legislatures during the coming year.

To further bring the legislature situation up to date, the occupational disease laws of Massachusetts, Ohio, and Pennsylvania have received important amendments.

New Laws

The new Arkansas law is of the "schedule" type, compensating for 38 specific diseases, as is the Idaho law which compensates for all groups including 15 or more specific diseases. Maryland's new law contains a list of 34 compensable conditions.

Amendments

By the simple technique of adding the phrase "any other occupational disease" to its existing law, Ohio has significantly broadened the base of compensation. The Minnesota law was amended to include the hazards inci-

dent to fire fighting. The basic law of the State of Washington (1937) has been changed with respect to silicosis and asbestosis. Under the new amendment, the worker must have been employed in the State for 2 years prior to the injurious exposure in the State. For other diseases, the quiescent period is one year. The legislature also deleted the provision that occupational disease coverage shall be borne equally by employer and employee.

The New York Law was amended to provide for the extension of the 90-day period for medical treatment for dust diseases for an additional 180 days, and hereafter it need not be continuous.

Pennsylvania enacted a new and comprehensive occupational disease law, fixing benefits to be paid and establishing the procedures for making claims. While the same diseases specified in the old law are covered, the amount of compensation, which previously might be unlimited, is limited to a maximum of $7,500 for total disability from occupational disease (Section 306 (a)), except as to disability or death resulting from silicosis, anthracosilicosis or asbestosis, where compensation is limited to a maximum of $3,600 (Section 301 (a) (2)).

Montana called upon the Federal Government to provide benefits for workers suffering from silicosis under the social security law, and to provide grants-in-aid to States compensating for silicosis. A division of the Montana State Board of Health was authorized to supervise industrial hygiene work, and to supervise reporting of occupational diseases and the inspection of industrial premises.

Federal Legislation

At the last session of Congress there was introduced by Senator Murray—Senate Bill No. 2256, designed to afford Federal assistance to those States that provide compensation for dust diseases. The Bill provides that a State compensation program shall not be approved by the Secretary of Labor except upon certain specified conditions. It also grants to the Secretary of Labor broad discretionary powers with respect to the approval of plans for prevention. This Bill failed of enactment at the last session of Congress, but will undoubtedly be revived in some form at the coming session.

It seems to me that we must watch the development of such legislation very carefully if we are not to be hampered in our efforts at occupational disease control. I believe that this Senate Bill No. 2256 is objectionable for the following reasons.

Its subject matter is peculiarly within the province of State Jurisdiction. Industrial conditions within the States vary and, in enacting occupational disease compensation legislations, consideration must be given to the particular problems, industries, standards of living, and wage scales that prevail in a given State.

The plan of the proposed law is to provide federal funds for the compensation of injuries caused by dust diseases in those States whose laws are approved by Federal Secretary of Labor. The cost of compensation should fall upon those industries where dust hazards exist and not upon the taxpayers generally. Federal grants-in-aid of this nature would place the burden of compensation in

a place where it does not rightfully belong.

The Bill as it was presented was vague and indefinite. As drafted, the Bill grants to the Federal Secretary of Labor broad discretionary powers to approve or disapprove of State Legislation. Aside from any question of jurisdiction in this matter, it is questionable that such discretionary powers would permit the fullest operation of proper control measures.

On the other hand, there are two features of the Bill which I believe to be sound, and also indicative of the future trend of compensation legislation. The Bill prohibits the approval of a State compensation unless (1) provision is made for the payment of compensation for silicosis injuries equal to compensation for accidental injuries (traumatic); and (2) the State plan prohibits the waiver of disability benefits by workers.

The Trend

As we have seen, amendments to many of the laws have all ready been made, and further amendments will undoubtedly be necessary in order to perfect their administration. It is particularly interesting to note that in the laws recently enacted there has developed the tendency to create Medical Boards or Medical examiners to assist the administrative agency in the determination of the fact of injury and the evaluation of the disability arising from such injury.

Another tendency of recent legislations has been to liberalize compensation benefits to employees suffering with disabling silicosis or asbestosis. To me such amendments seem to be proper, so that ultimately there will be no distinction between the compensation paid for total disability from dust disease and that payable for total disability from traumatic injuries.

Of even greater importance, however, is the activity in the various States to perfect the methods of prevention. It is interesting to note that bureaus of industrial hygiene are now operating in thirty States and in the cities of Detroit, St. Louis, and Baltimore.

The public generally has adopted a saner attitude toward occupational disease legislation in the past year than has heretofore existed. We have seen many evidences of the co-operation of employers, employees and State agencies to solve the various problems presented by this legislation. Our laws now enacted may not be perfect, but they have accomplished, generally, the purpose for which they were designed. That purpose is to provide reasonable protection and compensation for occupational disease injuries, and to establish machinery for the prevention of the various occupational diseases.

WHEN THE CALL IS FOR
"A BANDAGE—QUICK!"
Use **Band-me-Quick** new Individual Bandage. Made of Gauztex. Self-adhering gauze sticks only to itself—not to flesh. Medicated pad. 9-inch length. Keeps out dirt yet air circulates freely. No **Throw-Aways.** Each Band - me - Quick cellophane wrapped. **Stays fresh.** 100 to a box. Order from supply house or GENERAL BANDAGES, INC., 508 S. Dearborn St., Chicago.

GAUZTEX
Band-me-Quick
INDIVIDUAL BANDAGE

New Produc

SWEATBAND for industrial workers, or anyone else doing heavy physical work, is announced by the American Optical Company. The band is of synthetic sponge, can be washed and sterilized, and is light in weight as well as inexpensive.

OXYGEN RECORDER for sampling and recording oxygen content in the air has just been developed by Mine Safety Appliances, Inc. Designed for permanent installation and continuous operation, the instrument can be used to control oxygen in chemical

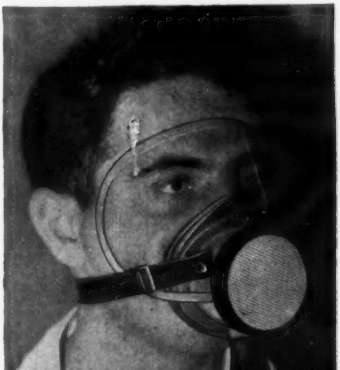
processing, to measure oxygen in hydrogen atmospheres used in hydrogenation operations, and to measure oxygen in natural, coke-oven, and blast furnace gases.

TANNIC ACID TREATMENT for burns is possible with the new product "Tannoid" developed by Davis Emergency Equipment Company. "Tannoid" is a water-soluble jelly, relieving pain, lessening toxic effect, and reducing the formation of scar tissue. It is supplied in 5 oz. and 1½ oz. tubes, and in unit cartons containing six ⅛ oz. tubes

RUBBER INSULATED, safety, portable light, which is shock-proof, and will prevent the entrance of dusts, fumes, gases and moisture, is announced by the Euclid Rubber & Mfg. Co. The new light is intended for use in hazardous locations, or in close quarters.

DISPENSER for aspirin tablets, similar to those found so useful in dispensing salt tablets, has been placed on the market by Canfield Laboratories. The dispenser, which is designed to be attached to a permanent stand, provides the tablets in a completely sanitary condition.

EYESHIELD-RESPIRATOR which combines protection for the face and eyes with breathing protection, is announced by Pul-



mosan Safety Equipment Company. Full, unobstructed vision is assured by the lightweight face shield, and the respiratory tract is protected against dusts. The complete

Additional information and descriptive literature on any of the products mentioned in this service department may be obtained by writing ***Dept. N,*** OCCUPATIONAL HAZARDS & SAFETY, *812 Huron Road, Cleveland, Ohio.*

THE FIELD

eyeshield-respirator assembly is available in many Pulmosan Respirator models, or the eyeshields may be affixed to certain Pulmosan respirators now in use.

CORROSION-RESISTING FANS. The Autovent Fan & Blower Company announce a new chemical treatment on their acid-moisture proof and vapor-explosion proof propeller fans that goes a step further in their protection against corrosion and explosion.

This new chemical coating is especially recommended for use on fan wheels where extremely corrosive and highly concentrated acid or gas fume conditions prevail. Where acid-moisture proof fans are required, coated fan wheels are of heavy gauge steel, powered by fully enclosed round body motors that provide positive winding protection against all fumes and moisture. The vapor-explosion proof units have fan wheels of copper, brass, or other non-ferrous metals and motors bearing Underwriters Label, Class 1, Group D rating. Non-ferrous fan wheels used on vapor-explosion proof fans can also be treated with the new coating where severe corrosive fumes are handled. Special construction features of motor meet the specifications approved by the National Board of Fire Underwriters.

Statements made in connection with any product mentioned in this service department are based on manufacturers claims. Although these claims are believed to be true, this magazine does not guarantee that to be the case.

UNIT HEATER, electrically operated and designed for industrial installations, is announced by the American Foundry Equipment Co. The heater has a cast aluminum element, safety switch, down-draft air flow, and air-cooler cabinet

CLEANER ATTACHMENT. An attachment for Vacuum Cleaning Apparatus, which is designed to collect small objects such as nuts, screws, nails, etc. and prevent their reaching suction fan blades, is announced by The Breuer Electric Mfg. Co. Salvage of valuable parts, as well as protection of equipment, is thus made possible.

NEW DEVELOPMENT IN STACKERS. A new type of stacker operating control is announced by the Lewis-Shepard Corp. Contained in a dust-proof housing of modern design, and mounted on both sides of the stacker, the control allows the operator to control the machine from either side. Control handles are mounted on ball bearings directly connected to the controllershaft. Ease of control is achieved through a large radius segment and through the absence of links or intermediate gears to set up friction.

PROTECT The Surface To SAVE MONEY

. . . it is conservative to estimate that 1% of the industrial workers of the United States . . . are annually affected by occupational dermatitis.

WHEN YOU REALIZE that occupational diseases of the skin make up about two thirds of the number of all occupational diseases, you can readily see the importance of knowing where to expect to find dermatitis. Dr. Louis Schwartz, Medical Director of the United States Public Health Service, has assembled figures to indicate which industries and occupations are responsible for the greatest number of dermatitis cases.

It must be remembered in considering the frequency of dermatitis that the number of compensable cases is not synonymous with the extent of the hazards in a given industry. The more hazardous the industry, the greater the likelihood of the proper use of preventive measures. It is the semi-hazardous industries where management runs into trouble with dermatitis, largely because the hazards leading to dermatitis are not sufficiently recognized. And control measures are apt to be inadequate in these industries.

It is impossible to give complete, up-to-the-minute figures, because they are not reported in many states. But the figures we do have cover our large industrial states, and can well be taken as an example of conditions in industry generally. For instance, in nine representative states in 1933, of 8,875 cases of compensated occupational disease, 5,787 of these cases were dermatitis. This is about 68%.

Reports from five states since then indicate that dermatitis is on the increase. This, too, may be taken as be-

TABLE I

Occupational dermatitis in five representative industrial states

State	*Year*	*Total occ. disease*	*Cases of dermatitis*
Connecticut	1936	441	249
Massachusetts	1936	755	584
New Jersey	1936	418	293
Ohio	1936	1,500	1,092
New York	1937	1,764	1,125

ing representative of conditions over the country. While some progress is being made in the general field of occupational disease prevention, efforts in dermatitis prevention are not keeping step with the hazards encountered or newly developed.

From studies made by the United States Public Health Service among 100,000 workers in various factories, it was found that about one per cent of all workers in these factories had dermatitis within a period of a year. This does not include burns, acid splashes, skin wounds, and the like.

The figures in Table I give some indication of the extent of dermatitis.

Industries will vary in the percentage of their workers suffering from occupational dermatitis from 0.4% to 7.5% of all workers engaged in that industry. Table II gives total number of workers, number of cases of dermatitis, and percentages in the industries studied. It will be readily seen that an industry having compensable dermatitis in one to seven workers in every hundred has some way to go in the use of proper preventive measures.

With these figures available, employers in the industries where dermatitis is frequent can realize that they must take steps to control the cost of dermatitis hazards. One of the great causes of dermatitis is the fail-

Personal sanitation is one of the greatest single procedures in prevention of occupational dermatitis. Wash rooms, showers, lockers, soaps and towels can go far to minimize the possibility of irritations and infections of the skin.

TABLE II

*Yearly prevalence of occupational dermatitis by industries**

Industry	*Number of workers*	*Number of cases of dermatitis*	*Percentage of workers having dermatitis*
Synthetic Resin Manufacture	709	53	7.5%
Chemicals and Dye Manufacture	2,500	176	7.0%
Tanning	565	20	3.5%
Oil Refining	14,000	473	3.3%
Candy Manufacture	1,236	36	3.0%
Rayon Manufacture	4,000	80	2.0%
Fabric Dyeing	3,800	76	2.0%
Steel Manufacture	3,500	52	1.5%
Fur Dyeing	1,600	17	1.0%
Rubber Manufacture	8,000	84	1.0%
Glass Manufacture	5,700	54	1.0%
Automobile Manufacture	72,000	281	0.4%
	117,601	1,402	1.2%

ure to realize that hazards exist. When you know hazards exist, it is a plain waste of money not to undertake a preventive program.

Certain industries are in themselves conducive to occupational dermatitis. Certain other industries have a few operations and processes which can cause dermatitis. Table II describes the hazards by industries. Table III shows an analysis of 3,136 cases of occupational dermatitis where the occupation or industry of the affected person was unknown. The table shows the percentage of cases caused by certain specific groups of materials. While these figures are only for the limited group studied, they represent a large enough quantity to

(Continued on page 32)

TABLE III

Distribution of the 3,136 cases of occupational dermatitis for which the industry or occupation of the affected person was unknown, according to specific groups of materials.

Causative agent	*Percent of cases caused by each material*	*Causative Agent*	*Percent of cases caused by each material*
1. Acids and acid fumes	5.5%	10. Furs and fur dyes, hides	1.4%
2. Alkalis and their compounds	12.4%	11. Halogens and derivatives	1.4%
3. Biologic agents, fungi, etc.	1.1%	12. Metals and metal plating	11.1%
4. Building cement and concrete	1.4%	13. Vegetable oils	0.15%
5. Burns and physical agents	1.3%	14. Petroleum products and greases	7.3%
6. Chemicals, unspecified	1.9%	15. Plants	22.3%
7. Chromates and chromic acid	1.1%	16. Rubber and its compounds	1.7%
8. Dusts	1.7%	17. Solvents (other than mineral oils)	8.3%
9. Dyes and intermediates (fur dye not included)	3.0%	18. Miscellaneous	15.1%

This month in *Washington*

Safety is Crossing Your Bridges Before You Come to Them

By W. T. Cameron, Chief Safety Adviser
Division of Labor Standards, U. S. Department of Labor

SAFETY propaganda aims to heighten the worker's awareness of risk, to make anti-social certain traits—showing off, bravado, horseplay—and to foster a mental attitude portrayed by the slogan, "Think before you act—Be sure it's safe, then go ahead."

Safety propaganda employs many techniques and embraces many psychological appeals. It may take on all the showmanship of a Barnum and Bailey circus—include banners, flags, torch light parades, and even a mock funeral to bury an effigy of "Old Man Accident." It may appeal to man's deeper instincts—self-assertion—combativeness—curiosity—desire for recognition, or to "belong."

The most familiar examples of safety propaganda are the bill-boards with red and green lights dramatizing the accident record as alluringly as a baseball scoreboard, the safety flag flying over the plant, the familiar poster displays, safety committees, badges, awards and trophies.

Making workers perform their duties safely is a selling job. The men must get the idea; they must want to avoid accidents. Because it is a selling job, it seems only reasonable to put the idea across with tested selling methods. They work.

One company recently went over all of their signs—reworded them using various personal appeals. For instance, on certain machines men should not wear gloves. On such equipment the usual practice was to

put a safety sign reading, "Don't wear gloves when operating this machine." Under the new program the sign was changed to read, "Save your hand and protect your family's income by removing your gloves when operating this machine." The first sign represented only an order, the second a logical "reason why" and a personal benefit to be derived.

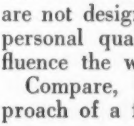
One of the functions of safety propaganda is to heighten the awareness of risk to make the worker conscious of the dangers surrounding him. Now there is certainly no need to point out the actual harm that can accrue to the cause of accident prevention through misguided safety propaganda. We are all too familiar with the poster, the slogan, the article which makes the worker so overconscious of danger that movements which should be instinctive cease to be automatic and sure. Like the "hundred-legged worm" that got along perfectly well until he began to think out the order in which he should move his legs, and then was no longer able to move them.

"A definite distinction," according to Dr. Gustav Ichheiser, eminent psychologist, "must be drawn between training and propaganda. Vocational training with a view to the prevention of accidents consists in educational methods calculated to form those immediate personal qualities whose presence or absence is decisive in determining accident-proneness. On the other hand, propaganda for accident prevention consists in educational methods which are not designed to affect immediate personal qualities, but only to influence the worker's consciousness."

Compare, for instance, the approach of a foreman in charge of a gang about to transfer a heavy piece of machinery from a flat car to its bed in the shop. Before moving a hand he gets the men together and has them check over one by one the inventory of skids, rollers, jacks, prys, rigs and other accessories needed to do the job. The entire movement is then laid out before the men in detail—"The bridges are all crossed before they are come to"—and each man is assigned a definite task. The foreman asks each man in turn to recite that part of the job he is to perform at each stage of the process and ends up, "Are there any questions? All right boys, let's go."

You will note that there has been no mention of safety at any point during the discussion. Contrast this with the foreman who simply says, "All right boys, we've got a tough job ahead of us and if you don't look out, somebody's going to get hurt. Now you've all got to be careful or somebody's going to get his fingers or toes smashed. We don't want to spoil the safety record. All right, let's go and for goodness sakes, don't anybody get hurt." Every man now has uppermost in his mind a picture of crushed feet and mashed fingers and the disgrace that would come upon the gang if a worker is hurt.

So today, modern industrial plants are instituting training programs aimed not at telling "why" men shouldn't get hurt, but "how" to do their jobs with skill and understanding. Training which develops ingrained, deep-seated work habits; reactions which in dangerous situations will automatically govern behavior after the manner of instincts—training which might be characterized in the phrase, "Safety is a *way* of doing work."



HOW CLEAN IS THE AIR?

(Continued from page 16)

used—are relatively unimportant.

Some gases and vapors, notably carbon monoxide, hydrogen sulfide, and mercury, in minute amounts, give strong chemical reactions which make possible rapid estimations and, still better, continuous records of pollution. However, the great bulk of gases and vapors from organic solvents, such as benzene, carbon tetrachloride, and carbon disulfide, cannot be caught efficiently unless sampled at slow rates, such as ½ to 1 liter per minute. Some of them, such as benzene, can be absorbed directly in special solvents or absorbents, like charcoal or silica gel, or can be converted into another compound which

Indicator for determining the amount of benzol in the air.

Photo courtesy Mine Safety Appliances

can then be estimated by an appropriate method.

The greatest difficulty in estimating organic vapors in air occurs when mixtures of vapors are present. Unfortunately, this is all too often the case. Then, the devising of short cuts in itself offers a major problem, but local conditions sometimes permit the approximations of the proportions of the several ingredients in the collected sample and calculation of the total by estimating only the most easily-determined single constituent.

Routine Checks and Recording of Air Impurities

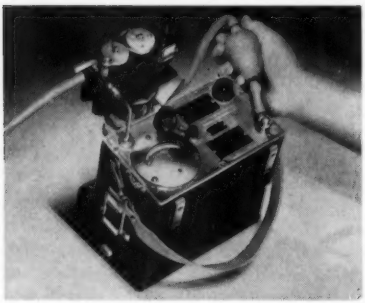
If control equipment has been installed, samples should be taken periodically for check-ups. This is the best way to tell whether the equipment is functioning as it should. If concentrations obviously are high, it is usually a waste of time to take the sample and to estimate it. Today, many plants operate crushing units and other dust producers at night to take advantage of reduced power rates and to stagger employment over twenty-four hours. During the night shift, dust inspections can be made rapidly, using nothing but the beam from an ordinary flash light to detect dust leaks.

In the case of some gases and vapors, our sense of smell often permits detection of gas concentrations which exceed desirable limits. Such a test is quite unreliable. One becomes used to even dangerous or disagreeable odors as hydrogen sulfide in a few minutes. It is, therefore, risky to estimate their strength by smell.

Such crude tests do not take the place of regular sampling technic. How often the routine samples should be taken depends entirely upon local conditions. In some places, they are taken daily, while in others several times a year is enough. It is well to play safe and to take them too often rather than too seldom. The men quickly become used to such sampling and pay no attention to the pro-

cedure. Obviously, the sooner the sampler has the man's interest in his results, the better will be the outcome.

Samples should be taken wherever men work. It is a mistake to ignore places where one believes that there is no dust or gas. The samples are about the only proof that the employer can bring forth that he has



Portable all-service indicator for determining the presence of combustible gases, and for indicating a deficiency of oxygen, and for indicating the presence of carbon monoxide and hydrogen sulphide in dangerously toxic concentrations.

taken proper precautions to prevent a disease, such as silicosis or a chronic poisoning from benzol. The mere statement that he or anyone else thought the atmosphere sufficiently clean is not enough.

Occasional photographs of various plant and mine operations are often of greater practical usefulness than are records of dust counts or of gas or vapor concentrations. As an exhibit on the company's bulletin boards, photographs are effective warnings to the men to clean up.

PROTECT THE SURFACE TO SAVE MONEY

(Continued from page 28)

be a good cross-section of all industrial employees. The conclusions to be drawn from this table can be considered an accurate guide in evaluating the compensable dermatitis cases in industry generally.

It must be remembered that these figures are *cases for which compensation has been paid* in the states studied. They in no sense represent the total number of occupational dermatitis cases. These cases reported represent, usually, incapacitation for one week or longer. An English authority (R. Prosser White) estimates that only one case in ten finds its way into such compilations as this. The remaining nine cases are not compensated for, are not properly diagnosed, or for some other reason are not included in official tabulations.

SAFETY VALVE

(Continued from page 4)

has taken old metal first-aid kit cabinets, painted them, and put hooks in them. These cabinets are hung on the wall near every operation where goggles are occasionally required. Then, every month, the goggles are sterilized, repaired if necessary, and new bands installed where needed. Goggles are now always in good condition and easy to get at. The plan has worked out well. It has not been necessary to reprimand a worker for not wearing goggles for many months.

A NUMBER OF meetings of interest to you who are working with safety and the prevention of occupational disease are scheduled within the next few weeks. In Chicago, from January 29 to February 2, will be held the 1940 Road Show-Convention; in Philadelphia on January 30 and 31 will be the Greater Philadelphia Safety Conference; in Jackson, Miss., the Southern Safety Conference will be held on February 1 and 2.

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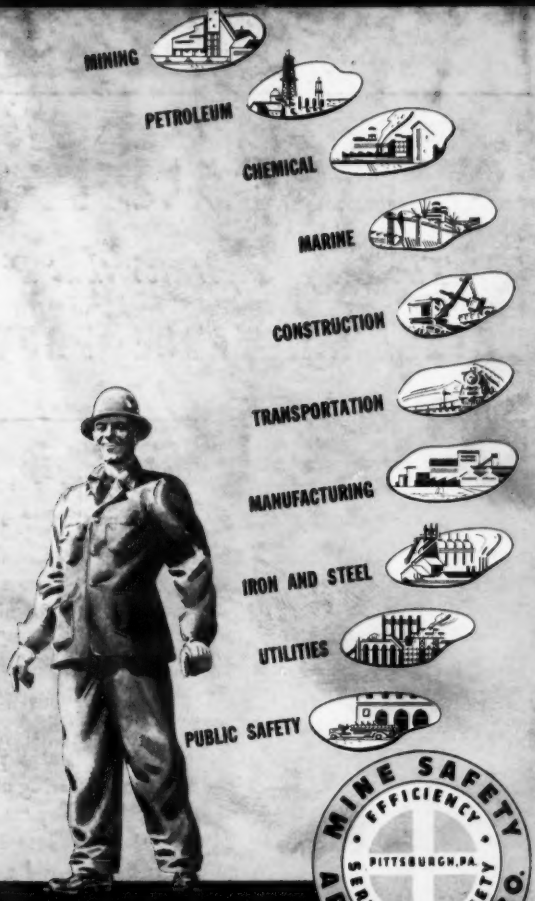

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